New Technology Helps Alcoa Cut Greenhouse Gases

By EDMUND F. SCHERR

U.S. aluminum giant cut its greenhouse gas emissions 25 percent in three years.

Photographs courtesy ALCOA

Left: Alcoa staffers Steve Saunders and Jamie Muir inspect the new carbon capture plant at the Kwinana alumina refinery in Australia.

Above: Alcoa's can reclamation facility in Tennessee recycles enough used beverage cans and other recyclables to produce 14 billion new cans a year.

Alcoa, a world leader in aluminum manufacturing, is also leading private sector efforts to reduce greenhouse gas emissions and use renewable energy resources. With operations in 44 countries, the U.S.-based company's policies and innovations have a global effect.

Alcoa was named by the World Economic Forum in Davos, Switzerland, as one of the top companies in sustainable use of natural resources in early 2007. Alcoa is also a founding member of the U.S. Climate Action Partnership, a collection of businesses and environmental groups lobbying the U.S. government for legislation limiting greenhouse gas emissions.

In 2000, the company laid out its goals for reducing its impact on the global environment through innovation and new technology. The goals included deep reductions in greenhouse gas emissions and waste product discharges. Alcoa reached its goal of reducing greenhouse gas emissions by 25 percent (from 1990 levels) in 2003, seven years ahead of schedule, even though aluminum production increased during that period.

The company believes that the aluminum industry can be "greenhouse gas neutral" by 2020.

Renewable energy is a key to Alcoa's efforts to reduce its environmental impact. It has used hydroelectric power as a major energy source for its smelting operations around the world since 1916 and is now evaluating the feasibility of building the world's first geothermal-powered aluminum production plant in Iceland.

In May 2007, Alcoa launched "carbon capture" technology at its Kwinana alumina refinery in western Australia. The process for capturing carbon dioxide mixes bauxite residue, a byproduct of the aluminum-making process, with carbon dioxide. This locks up large amounts of the greenhouse gas that otherwise would be released into the atmosphere.

By mixing carbon dioxide into the bauxite residue, the compound's pH level (a measure of acidity and alkalinity) is reduced to levels normally found in alkaline soil. This new mixture can be used as road foundation, building material or an additive to improve soil. This technology, which the company plans to share with the entire aluminum industry, will be used in Alcoa's alumina refineries worldwide. Alumina, also known as aluminum oxide, is the main component of bauxite, the principal ore used in aluminum production.

Alcoa is also researching innovative new "inert anode" technology to reduce greenhouse gas emissions even further. In the final stage of smelting, aluminum oxide, processed from bauxite ore, is placed in an electrolytic cell. A carbon rod, called an anode, is fed into the cell and charged with an electric current, converting the aluminum oxide into carbon monoxide, carbon dioxide and aluminum. The aluminum sinks to the bottom of the tank, where it is collected for additional processing, while the greenhouse gases escape through the opening where the anode is inserted.

Alcoa is working to develop technology that would allow it to replace carbon anodes with ones that would not react with the oxygen released in the electrolytic process to create greenhouse gases. The only byproduct of the "inert anode" process would be oxygen.

An industry study, the "Inert Anode Roadmap," says worldwide use of inert anodes could reduce greenhouse gas emissions by nearly 40 million metric tons. It also could reduce the amount of electricity needed to smelt aluminum oxide into aluminum by 25 percent.

Alcoa is working to reduce hazardous waste from its operations as well. The spent pot lining (SPL) that remains after the smelting process contains significant amounts of absorbed fluorides and some cyanide. In the past, this waste has been deposited in landfills.

However, the new Alcoa Portland SPL process converts SPL to aluminum fluoride (an important additive in aluminum production) and a harmless granulated glassy material called synthetic sand. This synthetic sand can be used to make roads and concrete.

For more information:

Alcoa's climate change policy
http://www.alcoa.com/global/en/environment/climate_change/climate_overview.asp

United States Climate Action Partnership
http://www.us-cap.org/

How is aluminum made?
http://www.youtube.com/watch?v=oTiRznsxauc

***Edmund F. Scherr** is a USINFO staff writer.*

Please share your views on this article. Write to editorspan@state.gov

CORPORATIONS